

SERVICE & MAINTENANCE MANUAL

Semi-Electric Stacker



Version 06/2013

SPM1030 -SHFW-001

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FOREWORD

Proper operation, maintenance, troubleshooting and repairs are necessary to preserve the performance of the pallet truck over a long period and ensure that fault and breakdowns do not occur. The purpose of this service manual is to provide necessary information especially in inspections, repair and maintenance.

WARNING

The majority of this pallet truck consists of steel, it can be completely recycled. Waste material in conjunction with repairs, maintenance, cleaning or scrapping, must be collected and disposed of in an environment-friendly way and in accordance with the directives of respective countries. Such work must be carried out in areas intended for this purpose. Recyclable material should be taken care of specialized authorities. Environmentally hazardous waste, such as oil filters, batteries and electronics, will have a negative effect on the environment or health, if handled incorrectly.

CAUTION

All of the information reported herein is based on data available at the moment of printing. Our products are constantly being developed and renewed, we reserves the right to modify our own products at any moment without prior notice and incurring in any sanction. So, it is suggested to always verify possible updates.

1. GENERAL

1.1 INTRODUCTION – MAINTENANCE SAFETY PRECAUTIONS

Maintenance work may cause injuries. Always take care to perform work safe, at least observing the following. It is of utmost importance that maintenance personnel pay strict attention to these warnings and precautions to avoid possible injury to themselves, others or damage to the equipment. A maintenance program must be followed to ensure that the machine is safe to operate.

The specific precautions to be observed during maintenance are inserted at the appropriate point in the manual. These precautions are, for the most parts, those that apply when servicing hydraulic and larger truck component parts.

⚠ WARNING MODIFICATION OF THE TRUCK WITHOUT CERTIFICATION BY A RESPONSIBLE AUTHORITY THAT THE TRUCK IS AT LEAST AS SAFE AS ORIGINALLY MANUFACTURED, IS A SAFETY VIOLATION.

⚠ WARNING SINCE THE TRUCK MANUFACTURER HAS NO DIRECT CONTROL OVER THE FIELD INSPECTION AND MAINTENANCE, SAFETY IN THIS AREA RESPONSIBILITY OF THE OWNER OR OPERATOR.

⚠ WARNING FAILURE TO COMPLY WITH SAFETY PRECAUTIONS, LISTED IN THIS SECTION MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH AND IS A SAFETY VIOLATION.

- When carrying out any operation or maintenance, have trained and experienced personnel to carry out the work.
- When carrying out any operation or maintenance, carefully read operation and maintenance handbook.
- Read all the precautions given on the decals which are fixed to the truck.
- Be sure you fully understand the content of the operation. It is important to prepare necessary tools and parts for maintain the truck.

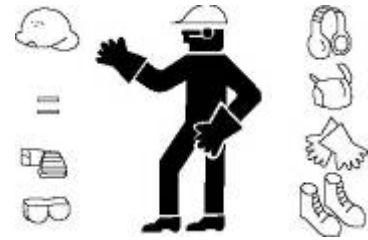
- Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.



- It should be noted that the machines hydraulic systems operate at extremely high potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system. Relieve system pressure by cycling the applicable control several times with the engine(motor) stopped and ignition on, to direct any line pressure back into the reservoir. Pressure feed lines to system components can then be disconnected with minimal fluid loss.



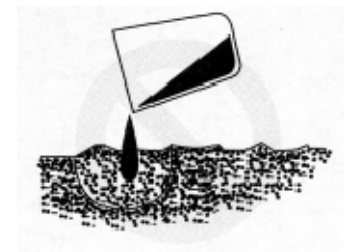
- Remove all rings, watches and jewelry when performing any maintenance.
- Wear well-fitting helmet, safety shoes and working Clothes When drilling grinding or hammering always. Wear protective goggles. Always do up safety clothes properly so that they do. Not catch on protruding parts of machines. Do not wear oily clothes. When checking, always release battery plug. **DO NOT WEAR LONG HAIR UNRESTRAINED, OR LOOSE-FITTING CLOTHING AND NECKTIES WHICH ARE APT TO BECOME CAUGHT ON OR ENTANGLED IN EQUIPMENT.**



- During maintenance do not allow any unauthorized person, to stand near the machine.
- Flames should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil or electrolyte.



- Immediately remove any oil or grease on the floor of the operator's compartment or on the handrail. It is very dangerous if someone slips while on the machine.



- Always use pure oil or grease, and be sure to use clean containers.

- Oil is a dangerous substance. Never handle oil, grease or oily clothes in places where there is any fire or flame. As preparation for use of fire extinguishers and other fire- fighting equipment.



- Keep the battery away from fire hazards. The generated gases are explosive.
- Store all the oils in a specified place.
- Keep the flammable things away from the machine. Do not smoke at the working place.



- Battery should always be disconnected during replacement of electrical components.

- Always use the grades of grease and oil recommended by NOBLELIFT choose the viscosity specified for the ambient temperature.

- Exhaust gas is dangerous provide ventilation when working in a closed space.
- Avoid breathing dust that may be generated when handling components containing asbestos fibers. Wear a gas mask if necessary.



- When working on top of the machine, be careful not to lose your balance and fall.

- Hand a caution sign in the operator's compartment (for example "Do not start" or "Maintenance in progress"). This will prevent anyone from starting or moving the machine by mistake.



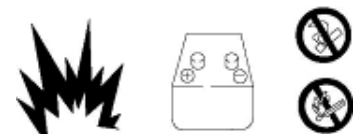
- When welding on the machine or working on the electrical system, ALWAYS turn the key switch OFF and remove the battery plug from the battery. Park the machine on firm, flat ground. Lower the fork to the min. height and stop the motor.



- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin and eat holes in clothing. If you spill acid on your clothes or skin, immediately flush with large quantities of water.



- When working on the battery, wear goggles or safety glasses. If splashed into the eyes, flush with water and get medical attention immediately.



- Battery terminals touched by metal objects can cause short circuit and burn you. Keep tools away from the terminals.
- Keep sparks, lighted matches, and open flame away from the top of battery. Battery (hydrogen) gas can explode.
- When disassembling and assembling the battery, make sure that the battery terminals (+, -) are correctly connected.



- If water gets into the electrical system, abnormal operation or failure can result. Do not use water or steam on sensors, connectors and instruments in the cab.



- Do not handle electrical equipment while wearing wet gloves, or in wet places, as this can cause electric shock.
- When working with other, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.
- Unless you have special instructions to the contrary, maintenance should always be carried out with the motor stopped. If maintenance is carried out with the motor running, there must be two technicians present: One operating the stacker and the other one performing the maintenance. In such a case, never touch any moving part.
- Before making adjustment, lubricating or performing any other maintenance, shut off all power controls.
- When removing parts containing O-ring Gaskets or seal clean the mounting surface and replace with new sealing parts.
- Thoroughly clean the machine. In particular, be careful to clean the grease fittings and the area around the dipsticks. Be careful not to let any dirt or dust into the system.
- Use only approved nonflammable cleaning solvents.
- When changing the oil or filter, check the drained oil and filter for any signs of excessive metal particles or other foreign materials.
- Always use NOBLELIFT genuine parts for replacement. ENSURE REPLACEMENT PARTS OR COMPONENTS ARE IDENTICAL OR EQUIVALENT TO ORIGINAL PARTS OR COMPONENTS.
- When checking an open gear case, there is a risk of dripping things in. Before removing the covers to inspect such cases, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.

1.2 MEASUREMENT CONVERSIONS

Length

Unit	cm	m	km	in	ft	yd	mile
cm	1	0.01	0.00001	0.3937	0.03281	0.01094	0.000006
m	100	1	0.001	39.37	3.2808	1.0936	0.00062
km	100000	1000	1	39370.7	3280.8	1093.6	0.62137
in	2.54	0.0254	0.000025	1	0.08333	0.02777	0.000015
ft	30.48	0.3048	0.000304	12	1	0.3333	0.000189
yd	91.44	0.9144	0.000914	36	3	1	0.000568
mile	160930	1609.3	1.6093	63360	5280	1760	1

1mm=0.1cm, 1 μ m=0.001mm

Area

Unit	cm ₂	m ₂	km ₂	a	ft ₂	yd ₂	in ₂
cm ₂	1	0.0001	–	0.000001	0.001076	0.000012	0.155000
m ₂	10000	1	0.000001	0.01	10.764	1.1958	1550.000
km ₂	–	1000000	1	10000	1076400	1195800	–
a	0.01	100	0.0001	1	1076.4	119.58	–
ft ₂	–	0.092903	–	0.000929	1	0.1111	144.000
yd ₂	–	0.83613	–	0.008361	9	1	1296.00
in ₂	6.4516	0.000645	–	–	0.006943	0.000771	1

1ha=100a, 1mile₂=259ha=2.59km₂

Volume

Unit	cm ₃ = cc	m ₃	l	in ₃	ft ₃	yd ₃
cm ₃ = m l	1	0.000001	0.001	0.061024	0.000035	0.000001
m ₃	1000000	1	1000	61024	35.315	1.30796
l	1000	0.001	1	61.024	0.035315	0.001308
in ₃	16.387	0.000016	0.01638	1	0.000578	0.000021
ft ₃	28316.8	0.028317	28.317	1728	1	0.03704
yd ₃	764529.8	0.76453	764.53	46656	27	1

1gal(US)=3785.41 cm₃=231 in₃=0.83267gal(US)

Weight

Unit	g	kg	t	oz	lb
g	1	0.001	0.000001	0.03527	0.0022
kg	1000	10	0.001	35.273	2.20459
t	1000000	1000	1	35273	2204.59
oz	28.3495	0.02835	0.000028	1	0.0625
lb	453.592	0.45359	0.000454	16	1

1 tone (metric)= 1.1023 ton(US)=0.9842 ton(UK)

Pressure

Unit	kgf/cm ₂	bar	Pa=N/m ₂	kPa	lbf/in ₂	lbf/ft ₂
kgf/cm ₂	1	0.98067	98066.5	98.0665	14.2233	2048.16
bar	1.01972	1	100000	100	14.5037	2088.6
Pa=N/m ₂	0.00001	0.001	1	0.001	0.00015	0.02086
kPa	0.01020	0.01	1000	1	0.14504	20.886
lbf/in ₂	0.07032	0.0689	6894.76	6.89476	1	144
lbf/ft ₂	0.00047	0.00047	47.88028	0.04788	0.00694	1

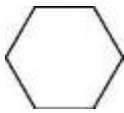
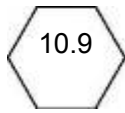
kgf/cm₂=735.56 Torr(mmHg)=0.96784atm

Standard tightening torque



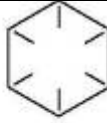
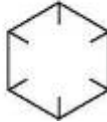
The following charts give the standard tightening torques of bolts and nuts.

Exceptions are given in sections of "Disassembly and Assembly"

METER TABLE

Classification	4T, 5T	10T
Bolt type		
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
M4	0.2 ± 0.02	0.4 ± 0.04
M5	0.3 ± 0.03	0.8 ± 0.08
M6	0.5 ± 0.05	1.4 ± 0.14
M8	1.2 ± 0.12	3.3 ± 0.3
M10	2.3 ± 0.23	6.5 ± 0.7
M12	4.0 ± 0.4	11.3 ± 1.1
M14	6.4 ± 0.6	17.9 ± 1.8
M16	9.5 ± 0.9	26.7 ± 2.7
M18	13.5 ± 1.4	38.0 ± 3.8
M20	18.6 ± 1.9	52.2 ± 5.2
M22	24.7 ± 2.5	69.4 ± 6.9
M24	32.1 ± 3.2	90.2 ± 9.0
M30	62.6 ± 6.3	176.1 ± 17.6
M36	108.2 ± 10.8	304.3 ± 30.4
M42	171.8 ± 17.2	483.2 ± 48.3
M45	211.3 ± 21.1	594.3 ± 50.4

INCH TABLE

	4T, 5T	10T
Classification Bolt type		  
Bolt size	Torque kgf · m (lbf · ft)	Torque kgf · m (lbf · ft)
1/4	0.6 ± 0.06	1.7 ± 0.2
5/16	1.2 ± 0.12	3.0 ± 0.3
3/8	2.0 ± 0.20	5.6 ± 0.5
7/16	3.2 ± 0.32	8.9 ± 0.9
1/2	4.7 ± 0.47	13.4 ± 1.3
9/16	6.8 ± 0.68	19.0 ± 1.9
5/8	9.3 ± 0.93	26.1 ± 2.6
3/4	16.0 ± 1.60	45.1 ± 4.5
7/8	25.5 ± 2.55	71.6 ± 7.2
1	38.0 ± 3.80	106.9 ± 10.7
1-1/8	54.1 ± 5.41	152.2 ± 15.2
1-1/4	74.2 ± 7.42	208.9 ± 20.9
1-3/4	98.8 ± 9.88	277.8 ± 27.8
1-1/2	128.2 ± 12.82	360.7 ± 36.1

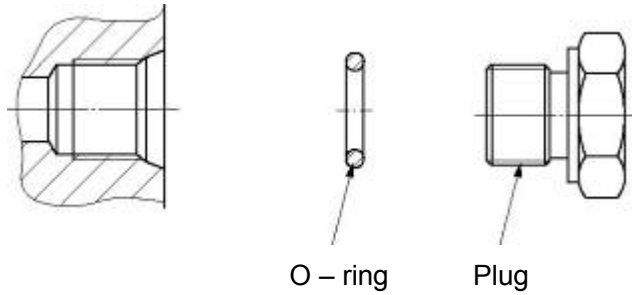
The torque in above table shall not be applied to nylon or nonferrous bolts or washer. The same is valid for not standardized ones.

㏏ Newton meter : 1 Nm = 0.1kgfm

TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

The following torque shall be applied to the split flange bolts.

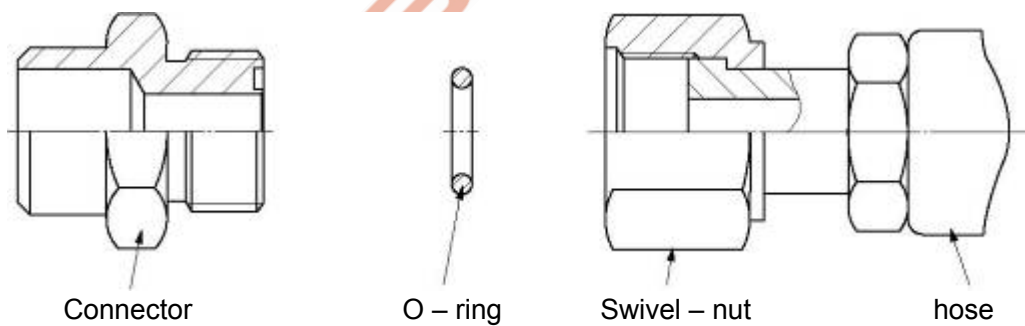
Diameter (mm)	Flat width (mm)	Torque	
		kgf·m	N·m
10	14	6.7 ± 0.7	66.7 ± 6.8
12	17	11.5 ± 1	112 ± 9.8
16	22	28.5 ± 3	279 ± 29



PF THREAD

Thread	Torque (kgf·m)
1/8	1.1 ± 0.1
1/4	2.6 ± 0.2
3/8	4.6 ± 0.3
1/2	8.5 ± 0.4
3/4	19 ± 1.0
1	33 ± 2.0

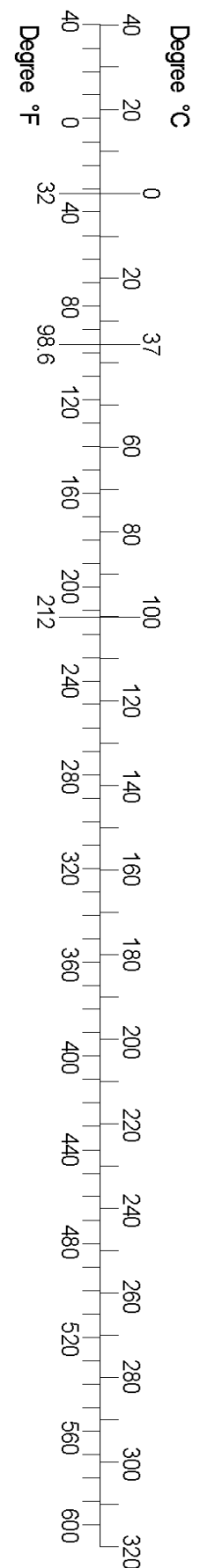
TORQUE FOR SWIVEL NUT WITH O-RING



Tube O.D (inch)	Thread (in)	Torque (kgf·m)
1/2	UN 13/16 - 16	9.5 ± 0.95
3/4	UN 1 3/16 - 12	18 ± 1.8
1	UN 1 7/16 - 12	21 ± 2.1

APPROXIMATE CONVERSIONS

SI Unit	Conv Factor	Non-SI Unit	Conv Factor	SI Unit
Torque				
Newton meter (N·m)	× 8.9	= in·in	× 0.113	= N·m
Newton meter (N·m)	× 0.74	= lb·ft.	× 1.36	= N·m
Newton meter (N·m)	× 0.102	= kg·m	× 7.22	= lb·ft.*
Pressure (Pa = N/m ²)				
kiloPascal (kPa)	× 4.0	= in. H ₂ O	× 0.249	= kPa
kiloPascal (kPa)	× 0.30	= in. Hg	× 3.38	= kPa
kiloPascal (kPa)	× 0.145	= psi	× 6.89	= kPa
(bar)	× 14.5	= psi	× 0.069	= bar*
(kg/cm ²)	× 14.22	= psi	× 0.070	= bar*
Newton/mm ²	× 145.04	= psi	× 0.069	= bar*
MegaPascal (MPa)	× 145	= psi	× 0.00689	= MPa
(Pa=N·m ²)				
Power r (W = J/s)				
kiloWatt (kW)	× 1.36	= PS (cv)	× 0.736	= kW
kiloWatt (kW)	× 1.34	= HP	× 0.746	= kW
kiloWatt (kW)	× 0.948	= Btu/s	× 1.055	= kW
Watt (W)	× 0.74	= ft·lb/s	× 1.36	= W
(W=J/s)				
Energy (J = N·m)				
kiloJoule (kJ)	× 0.948	= Btu	× 1.055	= kJ
Joule (J)	× 0.239	= calorie	× 4.19	= J
(J=N·m)				
Velocity and Acceleration				
meter per sec ² (m/s ²)	× 3.28	= ft/s ²	× 0.305	= m/s ²
meter per sec (m/s)	× 3.28	= ft/s	× 0.305	= m/s
kilometer per hour (km/h)	× 0.62	= mph	× 1.61	= km/h
Horse Power/Torque				
BHP × 5252 R.P.M. = TQ (lb·ft)			TQ Z R.P.M. 5252 = B.H.P.	
Temperature				
°C = (°F-32) ÷ 1.8			°F= (°C Z 1.8) + 32	
Flow Rate				
liter/min (dm ³ /min)	× 0.264	= US gal/min	× 3.785	= l/min
Note : () Non-SI Unit				



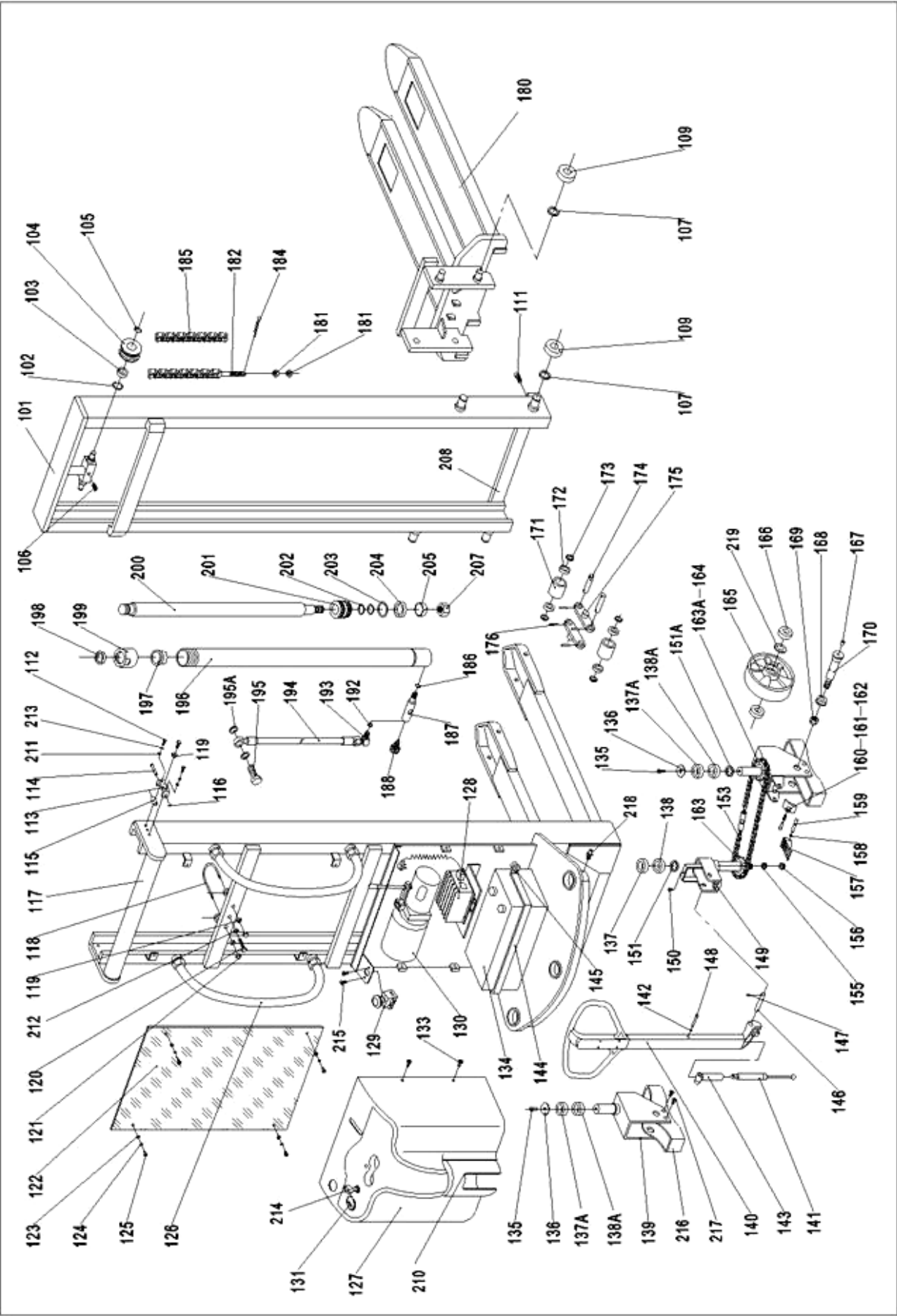
2. SPECIFICATION

2.1 OVERVIEW



1	Hydraulic system
2	Electric box
3	Steering system& wheel kits
4	Power pump unit
5	Fork carriage
6	Mast system

2.2 SPARE PARTS LIST



No.	Description	Qty.	No.	Description	Qty.
101	Inner Mast (2.5G)	1	158	Locking Ring	1
	Inner Mast (3.0G)	1	159	Shaft	1
102	Locking Ring	2	160	Brake	1
103	Bearing	2	161	Spring	1
104	Roller For Chain	2	162	Bolt	1
105	Locking Ring	2	163	Sprocket Wheel	1
106	Screw	1	163A	Sprocket Wheel	1
107	Washer	8	164	Seat of Turning Wheel	1
109	Roller	8	165	Big Wheel	2
111	Bolt	2	166	Bearing	4
112	Bolt	6	167	Oil holder	2
113	Crutch of Idler Pulley	2	168	Washer	2
114	Shaft	2	169	Locking Nut	2
115	Idler Pulley	2	170	Axle for wheel	2
116	Locking Ring	2	171	Loading Roller	4
117	Mast (2.5G)	1	172	Bearing	8
	Mast (3.0G)	1	173	Washer	8
118	Hoop	1	174	Shaft	4
119	Nut	4	175	Linking Plate	4
120	Bolt	1	176	Elastic Pin	8
121	Nut	2	180	Fork Carriage	1
122	Protecting Meshwork (2.5G)	1	181	Nut	4
	Protecting Meshwork (3.0G)	1	182	Link bolt	2
123	Protecting Washer	4	184	Split pin	2
124	Washer	4	185	Chain (2.5G)	2
125	Bolt	4		Chain (3.0G)	2
126	Handle	2	186	O-Ring	1
127	Cover	1	187	Body of Valve	1
128	Charger	1	188	Safety valve	1
129	Urgent Switch	1	192	Seal Washer	1
130	Pump Station	1	193	Elbow Bend	1
131	Voltage Meter	1	194	Pipe	1
133	Bolt	4	195	Bolt for pipe	1
134	Battery	1	195A	Seal washer	2
135	Bolt	2	196	Cylinder: for lifting height 2.5m	1
136	Cap	2		Cylinder: for lifting height 3.0m	1
137	Bearing	1	197	Sleeve	1
137A	Bearing	2	198	Dust Ring	1
138	Bearing	1	199	Screw cover	1
138A	Bearing	2	200	Piston rod: for lifting height 2.5m	1
139	Seat of Wheel	1		Piston rod: for lifting height 3.0m	1
140	Draw-Bar for Turning	1	201	Piston	1
141	Gas spring	1	202	O-Ring	2
142	Locking Ring	1	203	O-Ring	1
143	Seat of gas spring	1	204	Y ring	1
144	Hoop	1	205	Guide rings	1
145	Bolt	2	207	Nut	1
146	Shaft	1	208	Connect shank	1
147	Bolt	1	210	Round cover	1
148	Shaft	1	211	Washer	4
149	Seat of Draw-Bar	1	212	Nut	1
150	Bolt	1	213	Elastic washer	4
151	Washer	1	214	Key switch (with key)	1
151A	Washer	1	215	Bolt	2
153	Chain	1	216	Protecting Cover	2
155	Washer	1	217	Bolt	8
156	Nut	1	218	Oil holder	2
157	Foot Plate	1	219	Washer	2

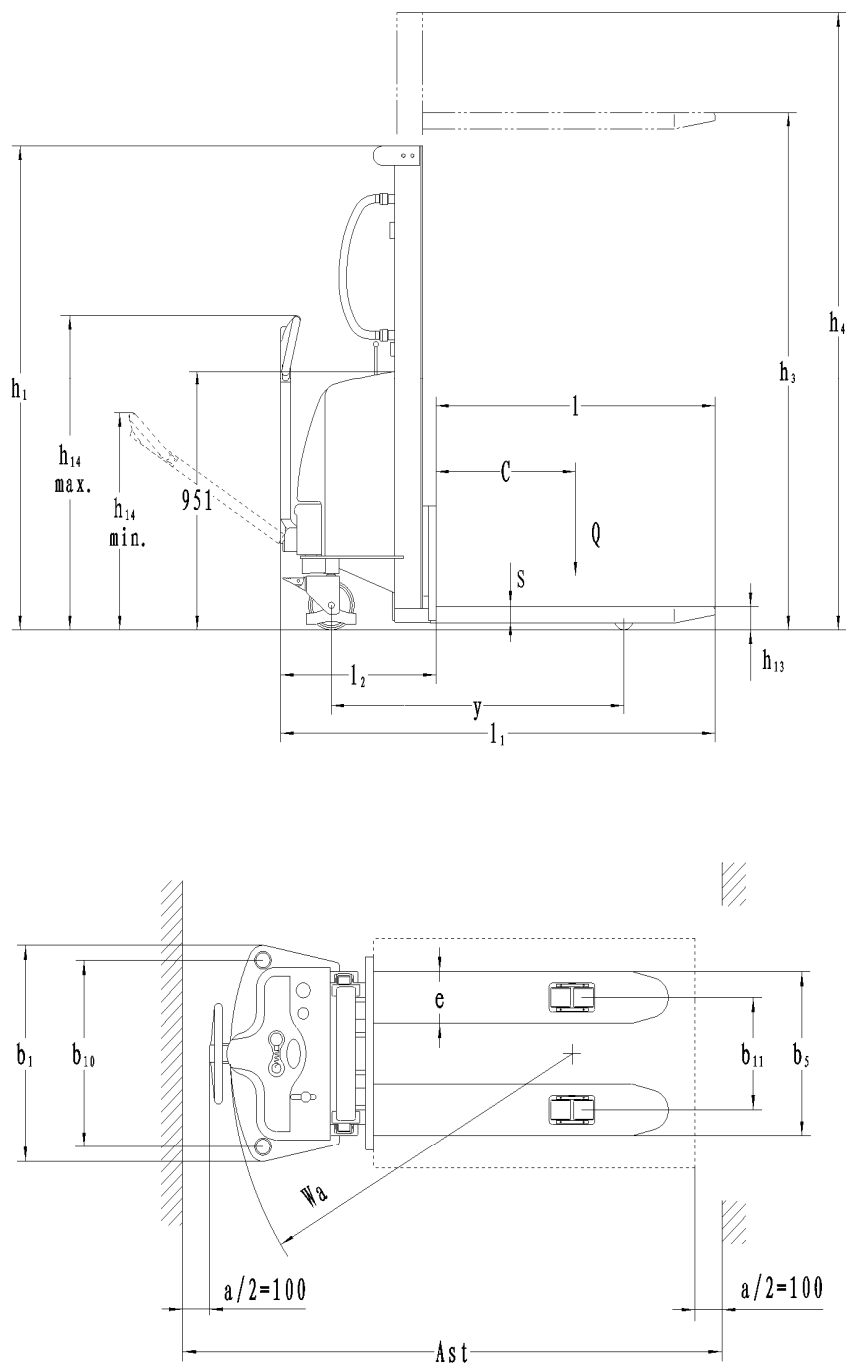
2.3 SPECIFICATION SHEET

2.3.1 RESIDUAL CAPACITY AT DIFFERENT LIFTING HEIGHT

Lifting height h_3 mm	Actual load capacity (Q) kg		
1500	1000	500	
2500	1000	400	
3000	600	300	
Load center distance (C) mm	600	800	

2.3.2
FEATURE

TECHNICAL



Features	1.2	Type	SPM1030(
	1.3	Power: electric (battery), diesel, gasoline, gas, hand	Hand
	1.4	Driving mode(hand, pedestrian, stand-on, sit-down, unit-pick)	Pedestrian
	1.5	Rated load capacity Q (kg)	1000
	1.6	Load center distance c (mm)	600
	1.9	Wheelbase y (mm)	1210
Weight	2.1	Service weight (with battery) kg	430
Tyres, chassis	3.1	Tire type: solid rubber, high-performance elastomer, nylon, PU	Nylon/ PU
	3.2	Tyre size, drive size mm	180x50
	3.3	Tyre size, load size mm	74x70
	3.5	Wheel number (front/rear)	2/4
	3.6	Wheel track (front) b ₁₀ (mm)	680
	3.7	Wheel track (rear) b ₁₁ (mm)	400/490
Dimensions	4.2	Enclosed mast height h ₁ (mm)	2080
	4.4	Lift height h ₃ (mm)	3000
	4.5	Max. mast height h ₄ (mm)	3570
	4.9	Height of tiller in drive position min. /max. h ₁₄ (mm)	790/1156
	4.15	Height, lowered h ₁₃ (mm)	85
	4.19	Overall length L ₁ (mm)	1720/1580
	4.20	Length to face of forks L ₂ (mm)	610/670
	4.21	Overall width b ₁ (mm)	777
	4.22	Fork dimensions s/e/L (mm)	60/180/1100
	4.25	Distance between fork arms b ₅ (mm)	570 330~640
	4.33	Aisle width for pallets 1000×1200 lengthway (1200 placed along fork)	2230
	4.34	Aisle width for pallets 800×1200 lengthway (1200 placed along fork)	2175
	4.35	Turning radius W _a (mm)	1400
Performance data	5.2	Lift speed, laden/ unladen mm/s	90/140
	5.3	Lowering speed, laden/ unladen mm/s	120/100
	5.11	Service brake	Manuel
Motor	6.2	Lift motor rating at 15% kw	1.5
	6.4	Battery voltage/ nominal capacity K ₅ V/Ah	12/150
	6.5	Battery weight kg	45

2.4 LUBRICATION

Hydraulic oil

⚠ CAUTION Hydraulic oil must have anti-wear qualities at least. It is not advisable to mix oils of different brands or types, as they may not contain the same required additives or be of comparable viscosities.

Name: Thickened hydraulic oil.

ISO Viscosity Grade			#40	#30
Characteristics		unit		
Viscosity	At 40°C	mm ² /s	57	48
	At 50°C		40	30
Viscosity index			≥ 150	≥ 150
Flash point, Cleveland open cup		°C	≥ 160	≥ 160
Pour point, Max		°C	≤ -35	≤ -35
Density at 15 °C		kg/m ³		861.5
Copper corrosion(100°C, 3h)		degree	≤ 1	≤ 1
Foaming (93.5 °C)		ml / ml	≤ 30/0	≤ 30/0
Vickers vane pump test, loss of mass (on vanes after 100h)		mg	≤ 100	15.3
Diameter of wear spot, 1200 r/min, 294N, 30min, 75 °C		mm	≤ 0.5	≤ 0.5

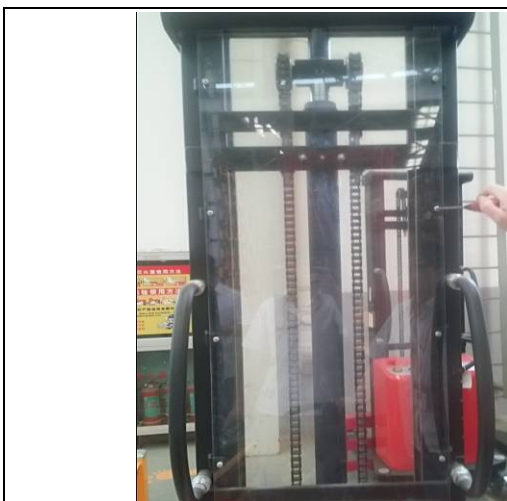
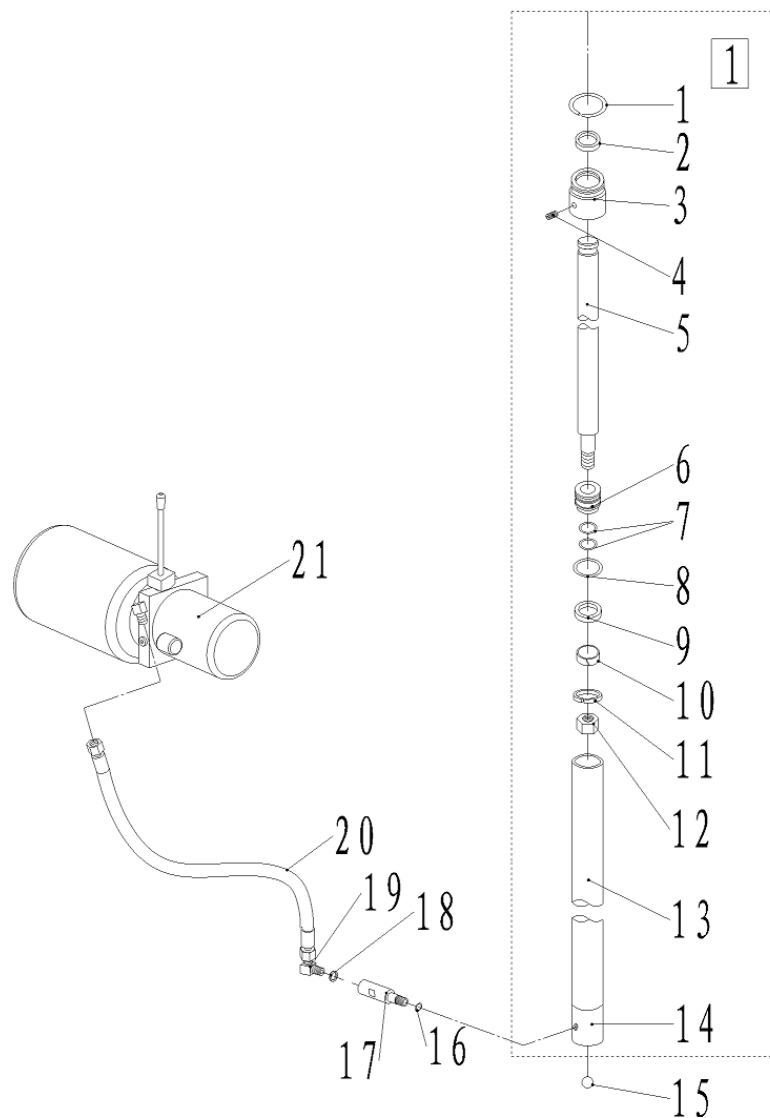
The oil for gear box

Name: Extreme pressure lithium-based grease, 1#.

Characteristics	unit	
Worked Penetration, 0.1mm		310--340
Dropping point,	°C	≥ 170
Extreme pressure (Timken OK)	N	≥ 177
Similar viscosity (-10 °C, 10s ⁻¹)	Pa. s	≤ 250
Corrosion preventive properties (52 °C, 48h)	Grade	1
Wire points oil (100 °C, 24h)	%	≤ 10

3. HYDRAULIC SYSTEM

3.1 OPERATION OF CYLINDER STRUCTURE

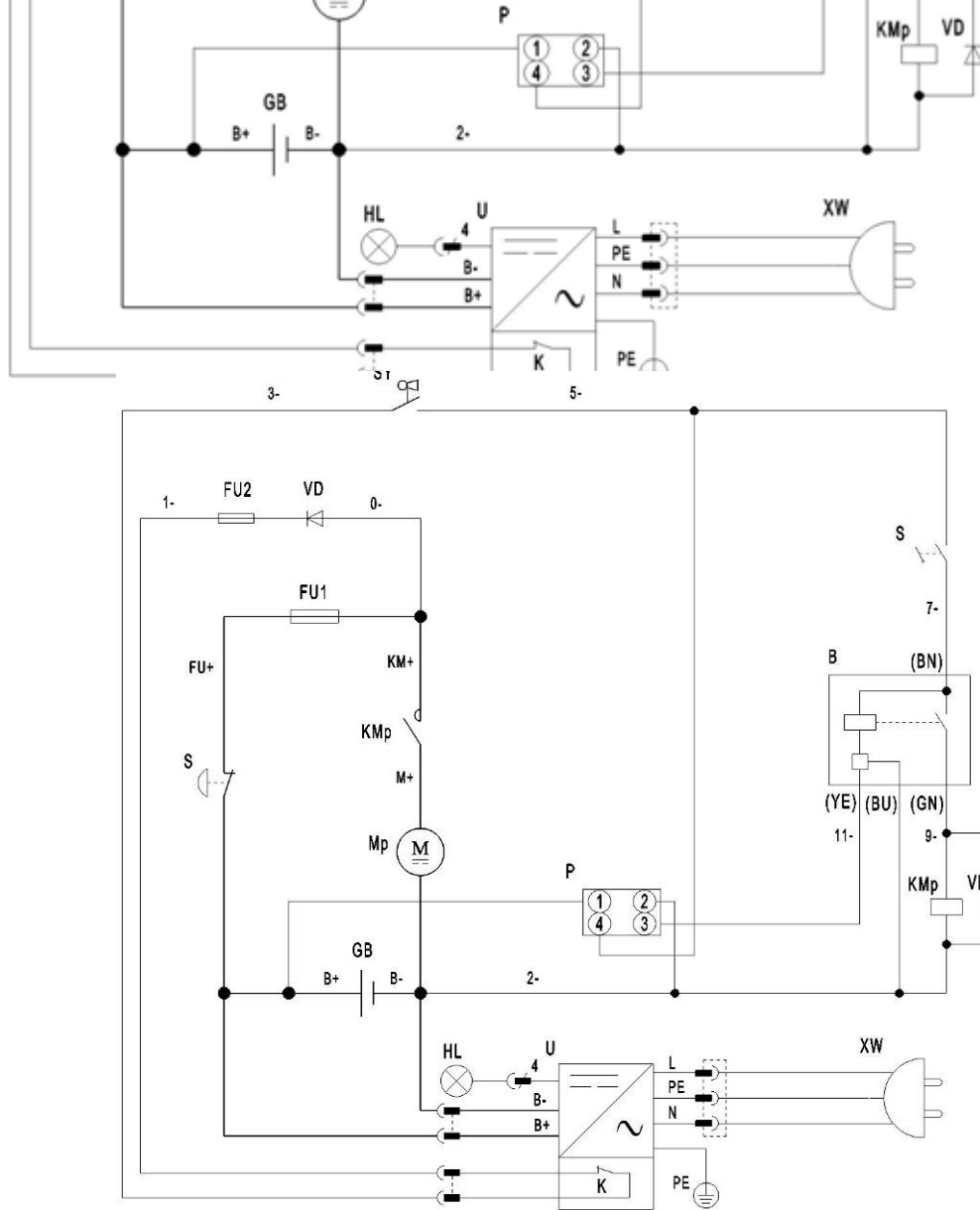


Remove 8 screws on the protecting meshwork and remove it



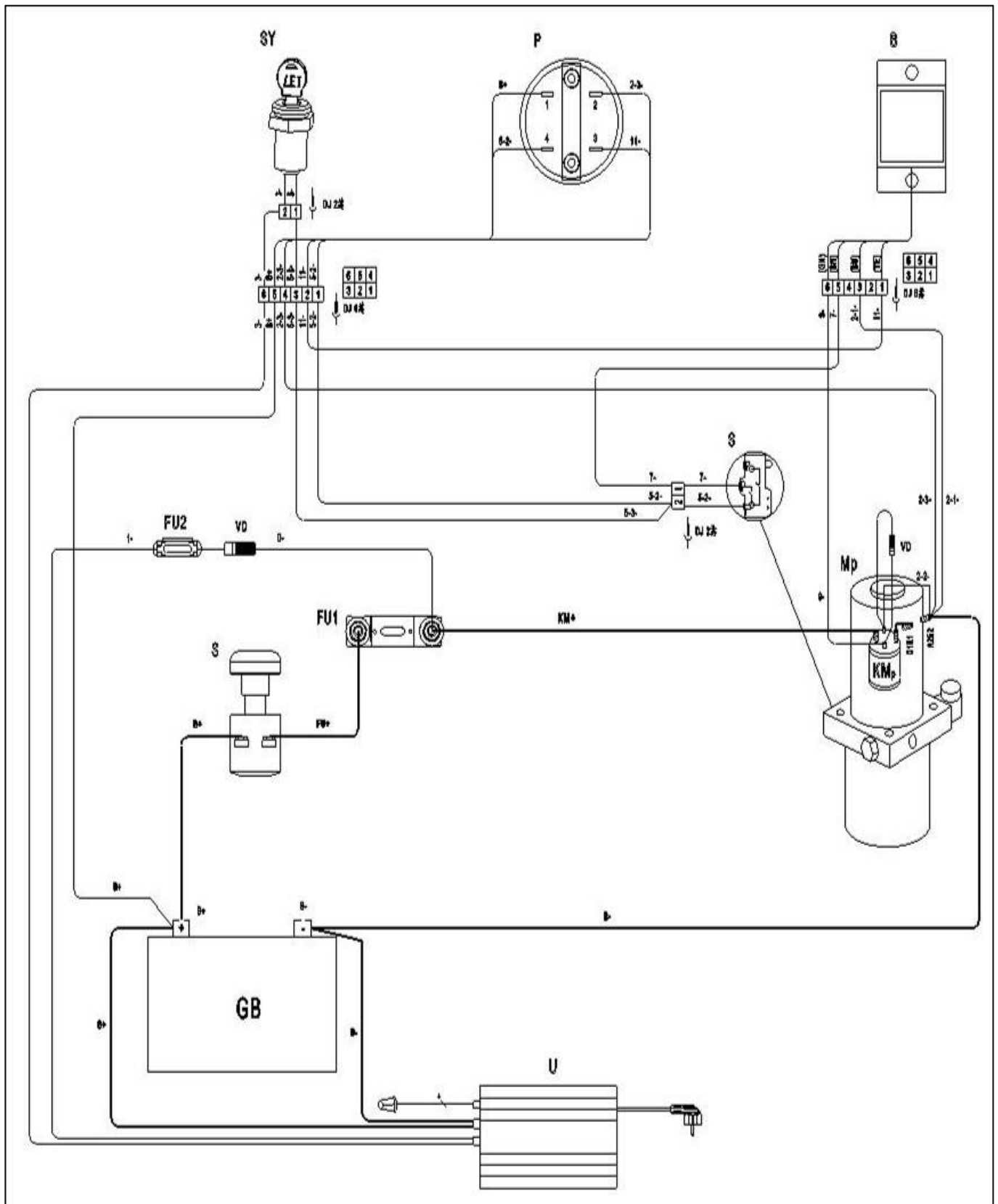
Remove 2 dome cap nuts and 2 hexagon nuts with wrench

	
<p>Now you can take away the hoop fixing the cylinder</p>	<p>Remove the screw of the hydraulic pipe</p>
	
<p>lift the fork up to a certain height and support the inner mast with a stick</p>	<p>Remove the screw on the seat for chain</p>
<p>The oil will spill over when removing; keep clean for the stacker and yourself!</p>	
	
<p>Press the Piston rod hard so that it can apart from the seat</p>	<p>Now you can remove the cylinder and replace it.</p>

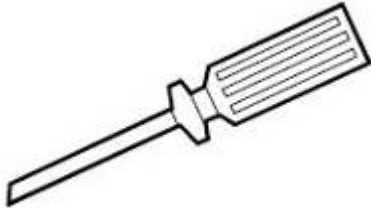
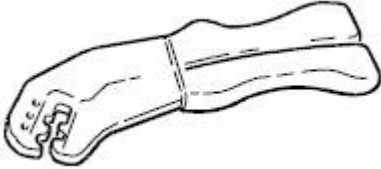
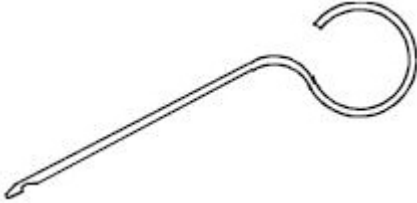
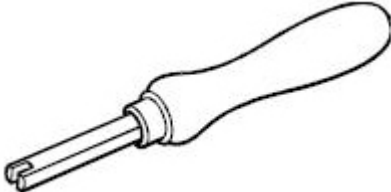
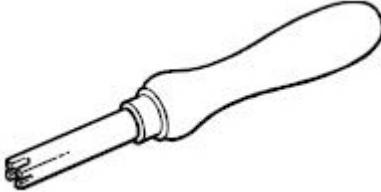
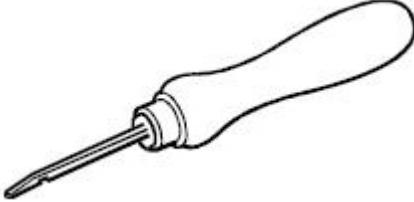


No.	Parts No.	Code	Description	Model	Qty.	Other
1	DQ-40	XW	Plug	3×0.75	1	Alternative
2	DQ-108	U	Charger	12V/20A QQE240-5CH20-26-A	1	Alternative
3	DQ-110	HL	Light of charger		1	Inside
4	DQ-105	GB	Battery	12V/150Ah	1	
5	DQ-106	S	Power switch	ZDK31-250	1	
6	DQ-46	FU1	Fuse 200A	200A	1	
7		KMp	Relay for motor	DC12V	1	Pump
8	WG-98T	Mp	Motor	1.5Kw	1	Pump
9	DQ-111	FU2	Fuse CNL-6A	6×30 6A	1	
10	DQ-10	VD	Diodes	1N5408	2	
11	DQ-39-2	SY	Key switch	LKS-101A	1	
12	DQ-113	P	Battery indicator	12V BL1201A(B)	1	
13	DQ-114	B	Module	BD-V-12	1	
14		S	Micro switch		1	Pump

CABLE SYSTEM



4.2 TOOL FOR REPAIRING THE PIN OF ELECTRIC PLUG

No.	Figure	Application
1		Tool for removal of pins / sleeves
2		Tool for application of pins / sleeves
3		Tool for release of lock
4		Tool for application of secondary locking 2 – pole
5		Tool for application of secondary locking 4 – pole
6		Tool for removal of pins / sleeves

4.3 REPLACE THE ELECTRIC PARTS

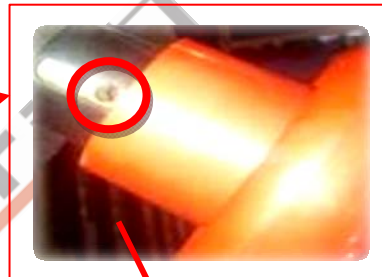
Switch off electrical power before repair!



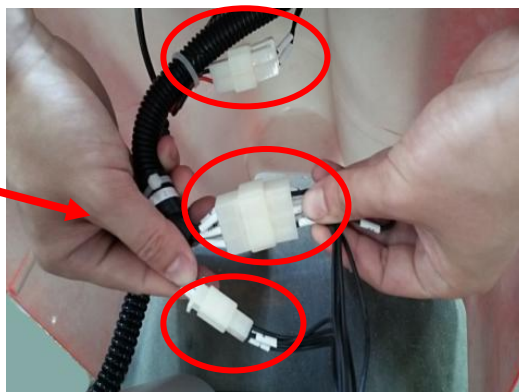
Remove 4 screws (each 2 on left and right) on the Cover, dismantle the washer, then you can remove the cover.



Turn the mushroom head of the emergency button; let the hole of the mandrill be line with the groove of the sleeve. Use a small screwdriver to insert the hole, and then turn counter-clockwise the mushroom head to remove the mushroom head.



Turn counter-clockwise the head of the control stick and remove it

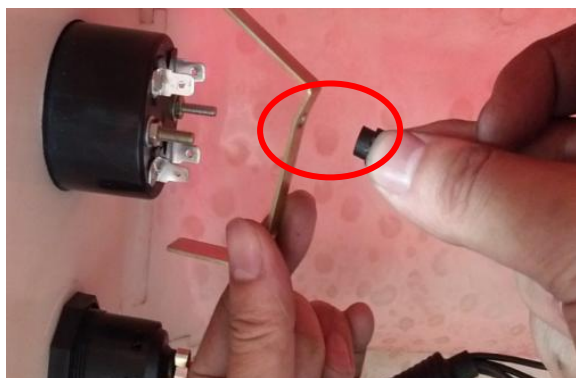


Now you can open the main cover. After dismantle the connector of charger, key switch, emergency button and battery indicator, you can remove the cover. All electric parts appear.

REPLACE THE BATTERY INDICATOR



Remove the 4 cables at the back of the indicator



Turn counter-clockwise the screw fixing the hoop, and then you can remove the indicator from outside.

REPLACE THE KEY SWITCH



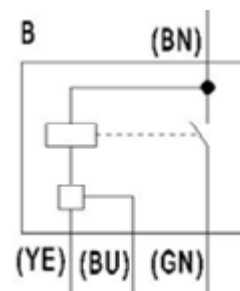
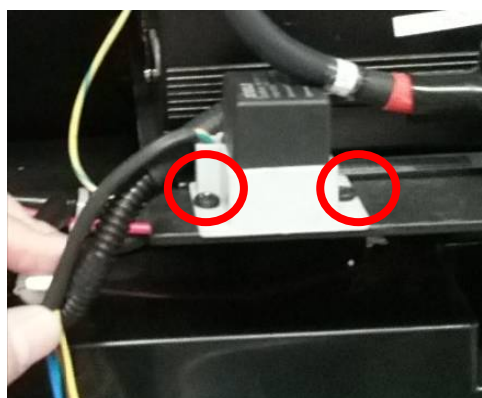
Turn counter-clockwise the screw of key switch with wrench and then you can remove it from outside

REPLACE THE EMERGENCY BUTTON



After dismantle the mushroom head and main cover you can see the frame of emergency button, remove 2 screws and remove 2 cables connecting to the emergency button, then you can replace it.

REPLACE THE VOLTAGE PROTECT MODULE



Remove 2 screws fixing the protect module, dismantle the connector and then you can remove the protecting module

OPERATION OF THE MAGNETIC VALVE

The Magnetic valve is a wearing part. If the forks automatically lower after lifting, the magnet valve may be blocked or damaged, remove it to clear or replace.



Remove the cable 9 on the micro switch of valve, and remove cable 2 on the motor



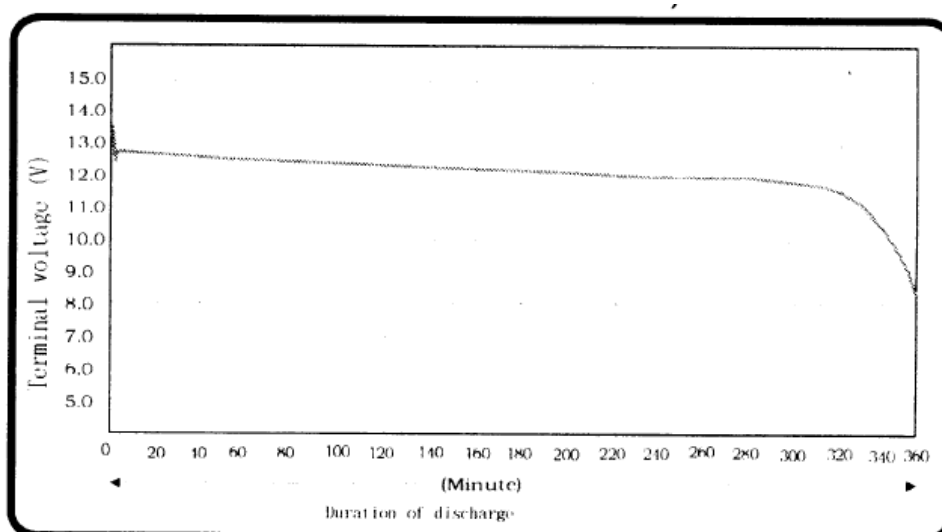
Turn counter-clockwise the fixing screw, and then you can remove the Magnetic valve and replace it

4.4 OPERATION OF THE BATTERY

The size of battery is according to English BS standard.

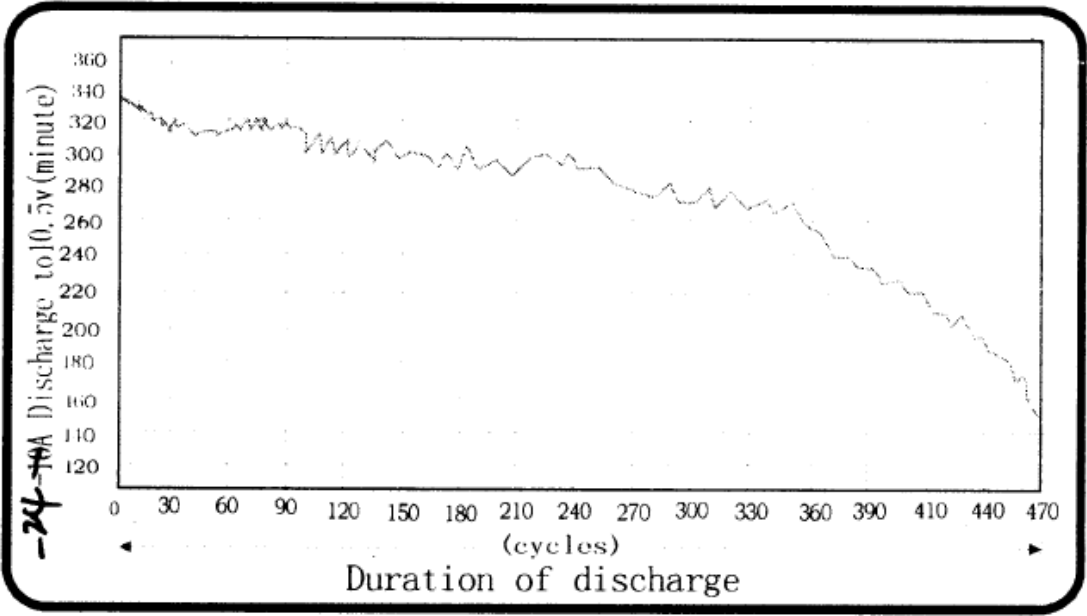
Rate	Specification
	SPM1030
Rated voltage	12V (X1)
Capacity (5 hours)	150Ah
Overall size (L*W*H)(mm)	523×238×283

24A DURATION OF DISCHARGING CURVE (ENVIRONMENTAL TEMPERATURE = 25°C)

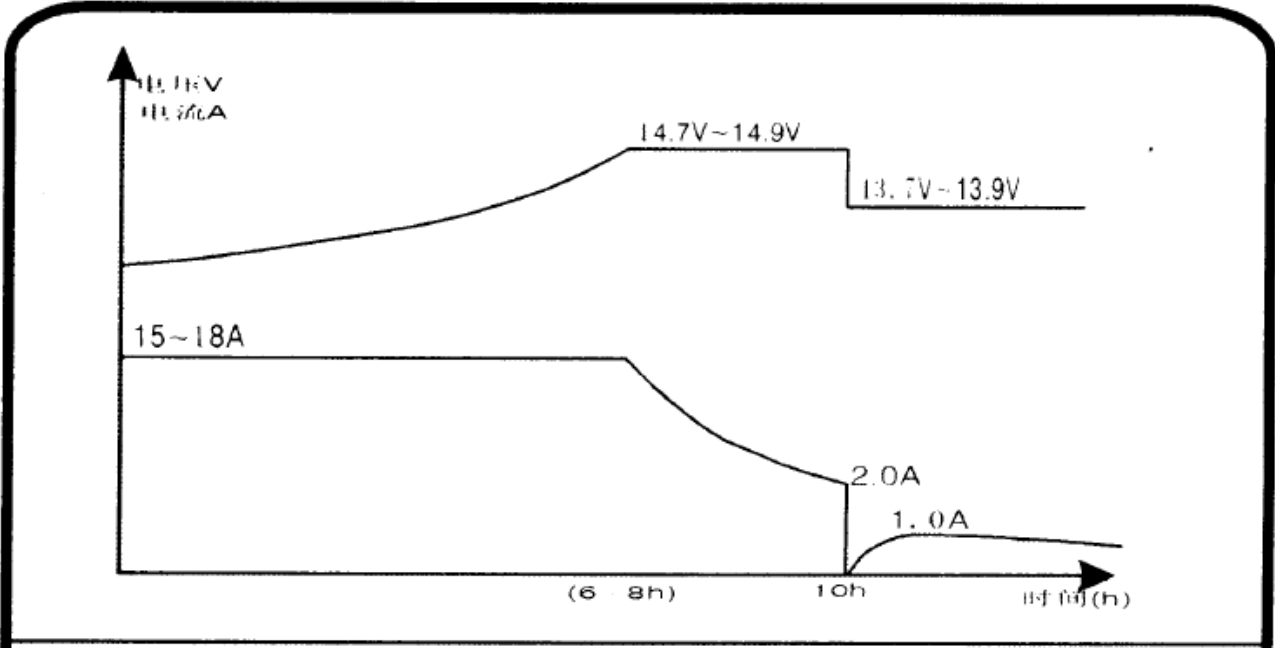


Discharging (min)

100% DURATION OF DISCHARGING LIFE TEST CURVE (ENVIRONMENTAL TEMPERATURE = 25 °C)



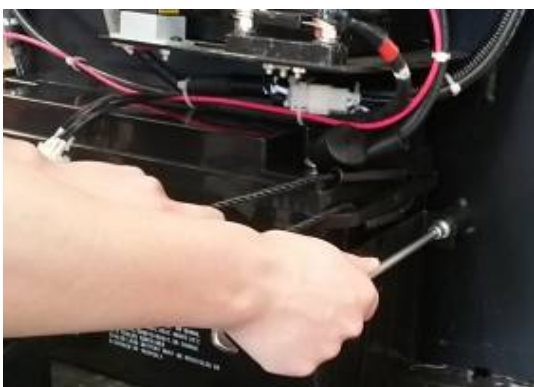
CHARGING CURVE



REPLACE THE BATTERY



Remove the bolts, nuts, washers, which fix the power cable (+, -) to the battery.



Remove the screws fixing the hoop, press the handle downward and you can remove the battery and replace it.

**Don't let the wrench to touch the other pole, otherwise it will cause short-circuit.
Avoid kicking by the rebound handle.**

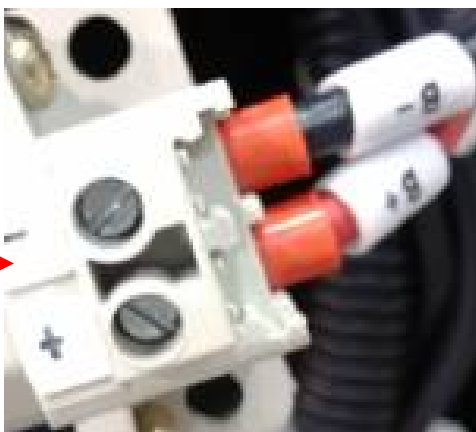


4.4 INSTRUCTION OF THE CHARGER



WARNING The battery generates flammable and explosive gases during charge, so excellent ventilation is required. Open the liquid refilling cap or seal cap. Do not smoke around the battery during charge. Any fire and spark is forbidden.

REPLACE THE CHARGER





Dismantle 2 screws fixing cable B+ and B-, and remove the connector, remove 2 screws at the bottom of the charger, then you can remove and replace it.

4.4.1 MAIN PRODYCT SPECIFICATION

Max. output power	Input voltage	Output voltage	Output current range	Combined regulation
300W	115Vac/230Vac	+14.7.0Vdc	19-21A	±3%

4.4.2 ENVIRONMENTAL CONDITION

No.	Item	Technical specification	Unit	Remark
1	Humidity	5%-95%		With package
2	Altitude	≤ 3000	m	Work normally
3	Cooling	The power supply is cooled by 80*80*25mm 12VDC ball-bearing fans Foreed air		Working under full load

4.4.3 ELECTRICAL CHARACTERISTICS

1	Input characteristics			
No.	Item	Technical specification	Unit	Remark
1.1	Rated input voltage	115/230	Vac	115Vac/230Vac select switch
1.2	Input voltage range	90-132/180-264	Vac	
1.3	AC input voltage frequency	47—63	Hz	
1.4	Inrush current	≤100	A	264Vac input/start-up in cold condition /environmental temperature is 25℃
1.5	Max input current	8	A	Vin=90Vac, rated load

2	Output characteristics			
No.	Item	Technical requirements	Unit	Remark
2.1	Fast charge voltage	14.2	Vdc	
2.2	Floating voltage	14.7	Vdc	
2.3	Maintain voltage	14.7	Vdc	
2.4	Constant current	20	A	
2.5	Cross regulation	±3%		
2.8	Power efficiency	≥80%		Vin=220Vac, rated load

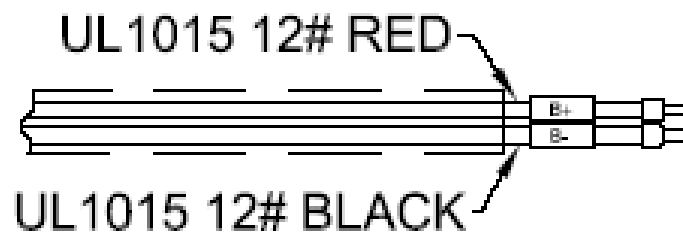
3	Protection characteristics			
No.	Item	Technical requirements		Remark
3.1	Output over voltage protection	16	V	Lockout
3.2	Software over voltage protection	The charger software limits the maximum output voltage to a level suitable for the connected battery system		
3.3	Thermal cutback	An internal temperature monitor reduce charger output power in extreme operational temperature to prevent damage		
3.4	Output current limiting protection	20A	A	@CC MODE
3.5	Output short circuit protection	Short circuit protection should be automatically recovery after remove the condition		
3.6	Electronic reverse battery protection	The charger is electronically protected against permanent revers battery connection		
3.7	Cell short circuit timer	The battery terminal voltage must excessed 10V within the first 30 minutes of charging or the battery is determined to have a short circuit and charging is terminated		

4	Charger(LED) indicator		
No.	Item	Status LED	Remark
1	Waiting model	LED OFF ALWAYS	
2	Fast charging	LED(RED)ON ALWAYS	
3	Floating charge	LED(YELLOW)ON ALWAYS	
4	Completely Charge	LED(GREEN)ON ALWAYS	

5	Safety & EMC			
No.	Item		Standard (or testing condition)	Remark
1	Electric strength test	Input—output	1500Vac/10mA/1min	No breakdown
2	Isolation resistance	Input—ground	≥10MΩ@500Vdc	
		Output—ground	≥10MΩ@500Vdc	
3	Leakage current		<3.5mA	Vin=264Vac,50—60Hz
4	SAFETY			Comply with CE standard
5	EMC	RE	CLASS B	EN55014
		CE	CLASS B	EN55014
		Air discharge	LEVEL 3	EN61000-4-2(discrimination B)
		Contact discharge	LEVEL 3	EN61000-4-2(discrimination B)
		RS	LEVEL 3	EN61000-4-6(discrimination A)
		CS	LEVEL 3	EN61000-4- 3 (discrimination A)
		EFT	LEVEL 3	EN61000-4-4 (discrimination B)
		Surge	LEVEL 3	EN61000-4-5, differential module 1 KV, common module 2KV(discrimination B)

Remark: discrimination A— function OK under technical requirement range; discrimination B—function temporarily debasement without reposition and halt is allowed; discrimination R— physical damage or failure of equipment are not allowed, but damage of protection device (fuse) caused by interference signal of outside is allowed, and the whole equipment can work normally after replacement of protection device and reset of running parameter.

2)、 Output terminator diagram & definition:



3)、 WEIGHT: (ABOUT 1.25Kg)

8. Package, transportation & storage

1)、 Package

There are product name, model, making of manufacturer, safety approval, and manufacturing date on the package box, and manual of specifications and packing list in the package box.

2)、 Transportation

Suit for transportation by truck, ship, and plane. The products should be shielded by tent from sunshine, and loaded and unloaded carefully.

3)、 Storage

Products should be stored in package box when it is not used. And warehouse temperature should be -40°C — $+70^{\circ}\text{C}$, and relative humidity is 5%—95%. In the warehouse, there should not be harmful gas, inflammable, explosive products, and corrosive chemical products, and strong mechanical vibration, shock and strong magnetic field affection. The package box should be over ground at least 20cm height, and 50cm away from wall, thermal source, and vent. Under this requirement, product has 2 years of storage period, and should be rechecked when over 2 years.

9. Reliability requirements

1)、 Reliability



MTBF (standard, environmental temperature, load requirement) ≥ 15 K hour ; testing condition: 25°C , full load, testing proved value. (1 year full warranty)

10. Charger wiring

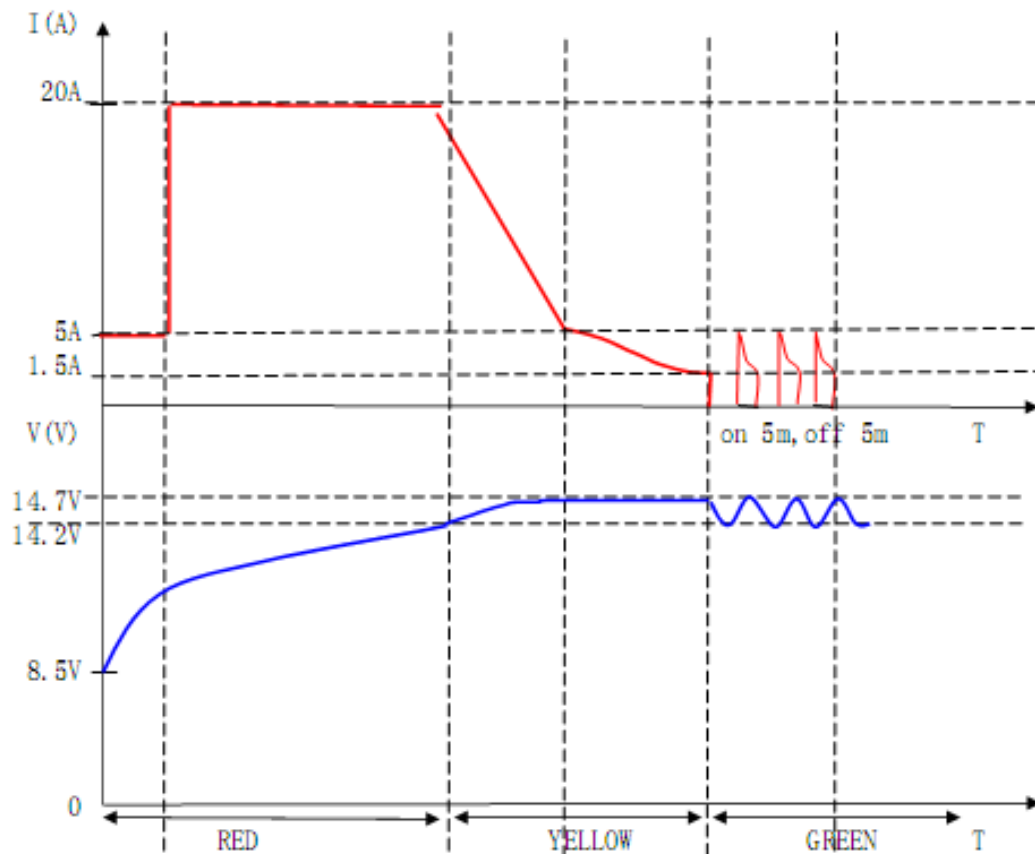
1)、 A spark often on first connection of the charge to the battery terminals due to charging the internal output capacitors, This is Normal and should not lead to undue concern, care should be taken to ensure the battery vent caps are closed and there are no flammable object in the vicinity of where the connection will be made

2)、 The charger has been calibrated to take account of the voltage drop in the DC output cables during operation, To prevent the possibility of over or under charging of the battery it is recommended the DC output cable are connected directly to the battery without modification. QQE are able to customize cable lengths and connections for volume customers with specific requirements

11. Label

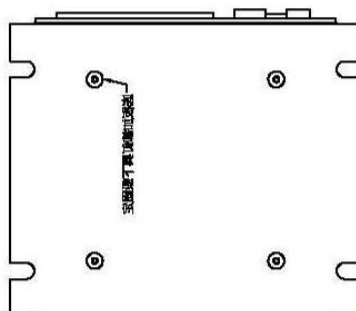
	MODEL:QQE240-5CH20-26-A INPUT: 115/230 VAC 50/60 Hz OUTPUT: 12 VDC 20A	
	LED MODE: <ol style="list-style-type: none"> 1. Waiting/Failure Mode: LED OFF Always 2. Fast Charge Mode : Red Status LED ON Always 3. Float Charge Mode : Yellow Status LED ON Always 4. Full Charged Mode : Green Status LED ON Always 	

12. CHARGE CURVE



13. Mechanical outline

習算	(使用2)	0230版	総計15台導入
化学科用教材	(使用2)	DL047-5の31種版	総計15台導入
化学科用教材	(使用2)	DL047-5の31種版	総計15台導入
化学科用教材	(使用2)	DL047-7の35種版	交換導入
化学科用教材	(使用2)	DL047-7の35種版	交換導入
化学科用教材	(使用2)	DL047-7の35種版	交換導入
化学科用教材	(使用2)	DL047-7の35種版	総計15台導入
化学科用教材	(使用2)	DL047-7の35種版	総計15台導入
教科書	面談	面談	導入

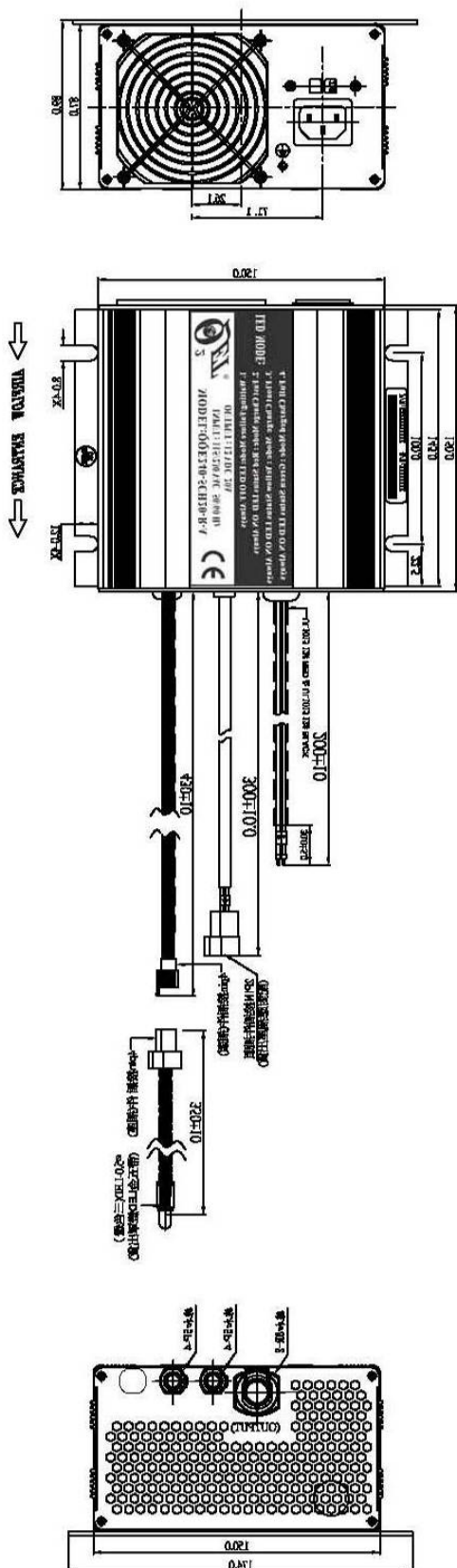


WALTERS COMMERCEBANK		NELTSEN
		SD08 08 38
B&D	BE	DATE
MODEL NO. : OCEANUSCHSD	ALITE. NO	SHEET: 1 OF 1
		REV: 0

Б-А05\УСГ:И\9

8 INSIDE BEARD PATCH TO BE 1/8" OFFSET OTHERWISE SPECIFIED
 9 TIBETS OTHER DATA MISSING TIBETS TO BE BRICK TELLERS ON A WHITE BACKGROUND
 10 B BROADSIDE TIBET MISSING TIBET AND INFORMATION TIBET LOCATED ON NOSED SURFACE
 11 1/2 BAKER SUBMIT MOST COINAGE TO CUSTOMERS, 2 SPEC
 12 8 DO NOT WITHA SCRATCH ON THE SURFACE
 13 C EMERALDSTONE MATERIAL SPEC ' VITRUMM' FOSILAR ETCALONES PYRAMIDE 4215C
 14 8 * 02 ----- 183Q-00 (MM)
 15 * SCRA SHEET MOST BE MINUS 1/2 THE BOTTOMING TORQUE INDICATED
 16 XX : +02 XX : +03 XX : +012
 17 8 LOTREFERENCE :
 18 5 OUTLINE DIMENSION : 114*0+120-88*0
 19 1 OML : MM

NOTES:



5. STEERING SYSTEM& WHEEL KITS

5.1 REMOVE THE AIR SPRING



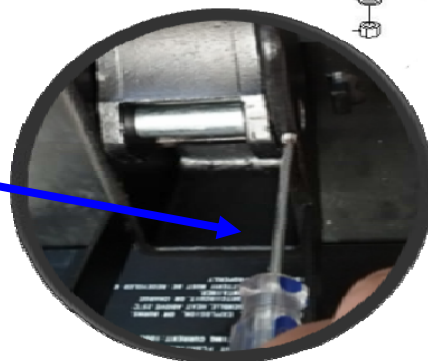
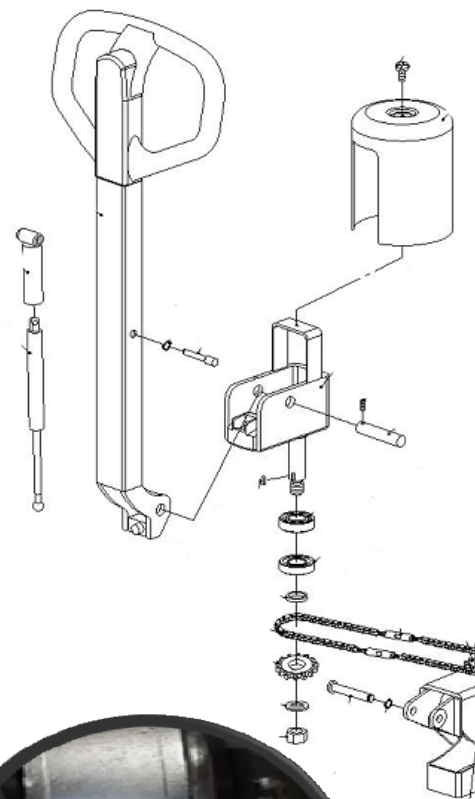
Remove the screws fixing the protecting cover of handle, and take it away with hands



Remove 2 screws under the handle with Allen wrench, then you can remove the air spring



Remove the screws fixing the shaft with screwdriver



5.2 REMOVE THE HANDLE



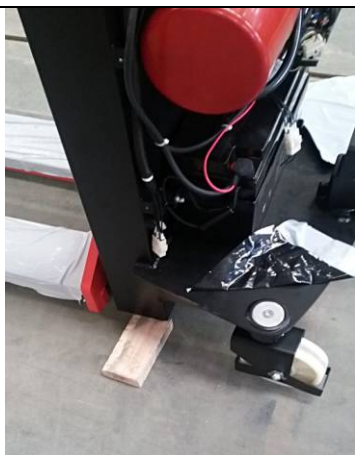
Strike out the shaft with hammer and puncher, and then you can remove the handle.

Hold tight the punch and avoid striking by the hammer!



5.2 OPERATION OF THE WHEEL

5.2.1 OPERATION OF THE BIG WHEEL (LEFT)



Support the mast with a block to keep the big wheel hanging

Remove the screw on the cap, and then you can remove the cap, bearing, bolt and wheel.



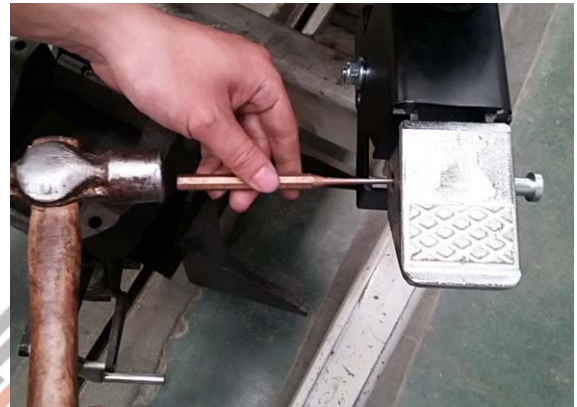
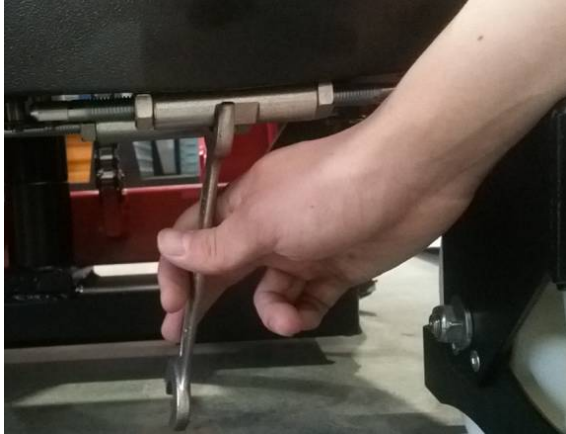
Remove the screw of big wheel with 2 wrenches

Strike out the shaft of the big wheel, then you can replace the wheel

Hold tight the punch and avoid striking by the hammer!



5.2.2 OPERATION OF THE FOOTBREAK



Remove the Retaining ring with spring pliers

Strike out the shaft, then you can remove the foot plate.

Hold tight the punch and avoid striking by the hammer!



Remove the bolt, you can see the spring, and then you can remove the whole brake.

	
<p>Remove the screw on the cap, and then you can remove the cap, bearing, bolt and wheel.</p>	<p>Now follow the steps of removing left wheel, you can remove the right wheel and the chain</p>

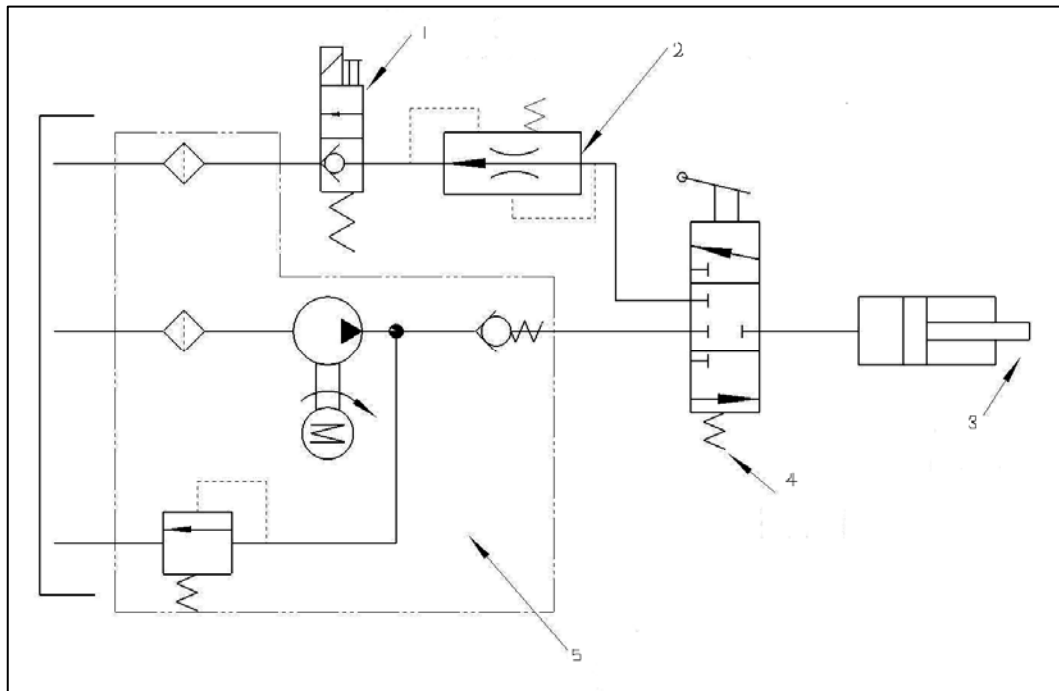
5.2.3 OPERATION OF THE LOADING ROLLER

	
<p>Support the mast with a block to keep the loading roller hanging</p>	<p>Strike out 4 elastic pin with hammer and puncher, remove the shaft and then you can remove the loading roller and replace it.</p>
<p>Hold tight the punch and avoid striking by the hammer!</p>	



6. POWER PUMP UNIT

HYDRAULIC FLOW DIAGRAM



1	Lowering valve
2	Emergency valve
3	Hydraulic cylinder
4	Control valve
5	Pump station

INSPECTION OF HYDRAULIC OIL

External appearance	Smell	Condition	Measurement
Clear and no discoloration	Fine	Fine	Possible to use
Clear but the color become brighter	Fine	Mixed with other oil	Inspect the viscosity and if fine it can be continuously used
Color changed like milk.	Fine	Mixed with air and water	Separate water or replace oil.
Color changed into dark brown	Bad	Oxidized	Replace oil.
Clear but there are small black spots	Fine	Mixed with other particles	Use after filtering.

Type: MD12160

Item	SPM1030
Rated voltage	12V
Rated output	1.6kw
R.P.M	2950 rpm
Rated current	200 A
Rated hour	2 min.
Insulation class	F class
IP Code	IP54
Displacement	2.0cc/rec

PUMP STATION OPERATION



Remove 3 screws on the relay and 1 screw on the motor, and then remove the cables.



keep the fork at the bottom, and remove the joint of the hydraulic pipe



Dismantle the connector of cables 7-, 5-2-, 5-1-, cut off the plastic band.



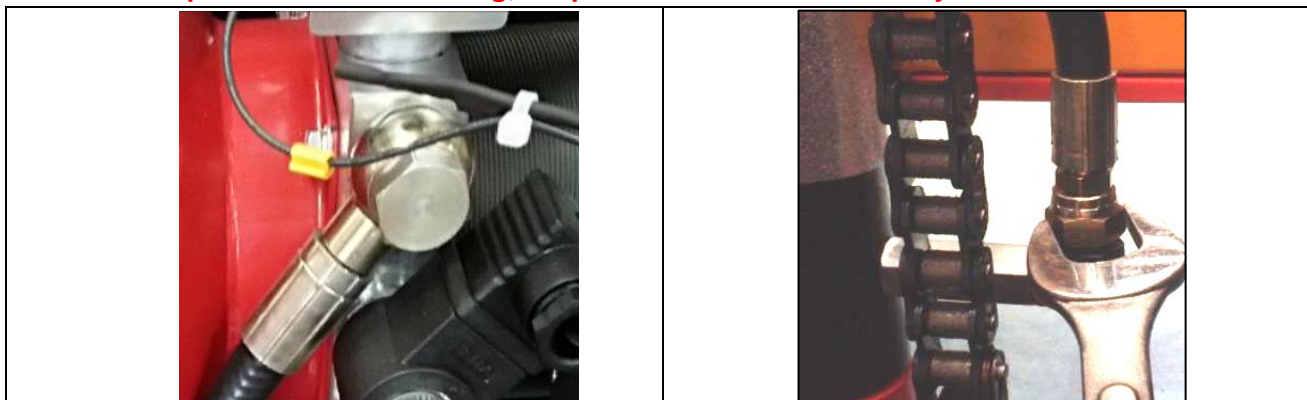
Remove 2 screws fixing the pump station at the back of the Electric box, and then you can remove the pump station and replace it.

HYDRAULIC PIPE

⚠ CAUTION

For shocking, the **joint** of the **hydraulic pipe** and hydraulic pipe might be loosed and leak oil, so usually check and tighten it

The oil will spill over when removing; keep clean for the stacker and yourself!



4.3 CLEAN OIL TANK AND FILTER

⚠ CAUTION

The **Plug Screw of port** for adding oil is ventilating. When lower, the air will come out from the tank, it might take out little oil vapor. So, it might appear little oil stains on the plug. Wait a little and ensure that there is no oil leakage.

⚠ WARNING

Put the fork of the ground and drain out the hydraulic oil

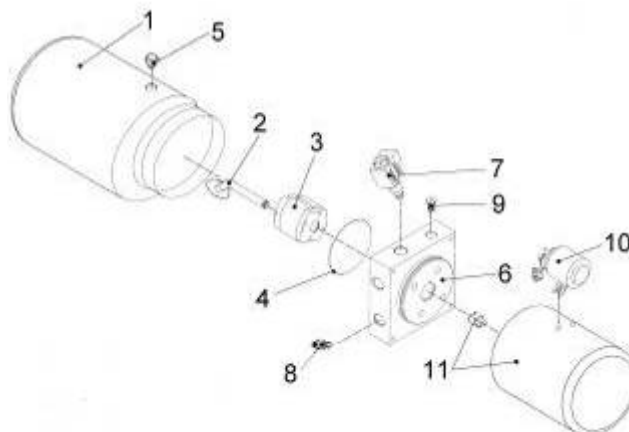


Dismantle the lid on the top of the tank , pour out the hydraulic oil



Dismantle the lid on the top of the tank, and fill the oil.

- Remove out the pump station.
- Loosen the hoop
- Remove the oil tank
- Remove the suction filter
- Cleaning of oil tank and filter.
- Clean the Fix plate for valve etc.
- Clean up with compressed air and inspect if the filter is stopped or damaged. If the filter is stopped or damaged, replace it.
- Remove dust or foreign material from the tank.
- Then assemble them.



TROUBLE DIAGNOSTICS

Symptom	Abnormality and cause	Measurement
Bubble in hydraulic oil	Mixed with air	Check if there is any place where air can be entered. Tighten the loosened part again.
Discoloration	Mixed with air and water	Replace the oil.
	Became inferior in quality by oxidizing or mixed with other particles.	Replace the oil.

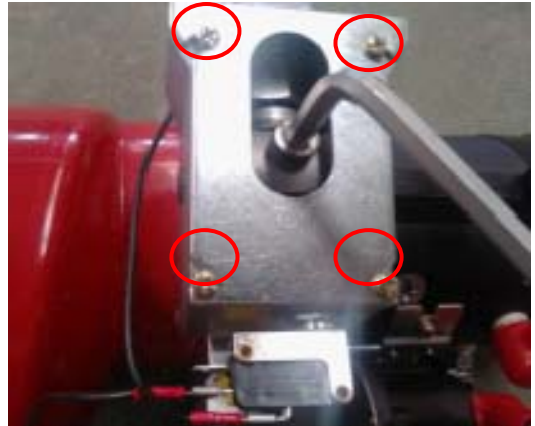


Remove 4 screws fixing the oil tank onto the valve plate, and then you can remove it.

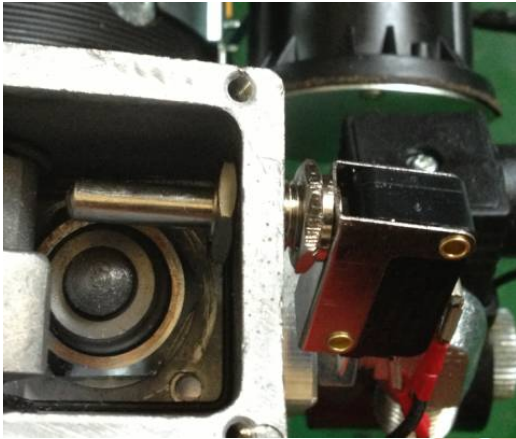


Remove the screw fixing the filter net, and then you can remove and replace it.

OPERATION OF THE CONTROL STICK

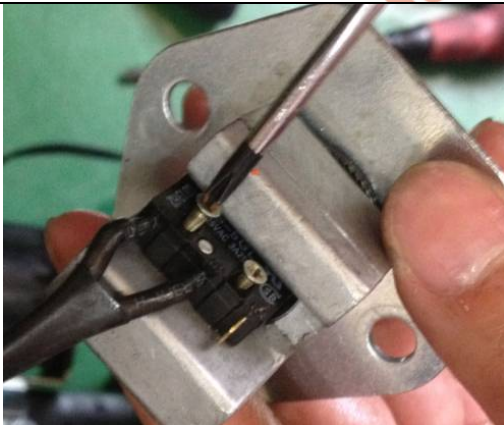


After remove the screw fixing the control stick you can remove it, and then remove 4 screws to dismantle the coverplate of control stick.



Loosen the screw fixing the control stick and remove it.

Remove 2 screws fixing the seat of micro switch.



Remove 2 screws fixing the Micro switch for lifting with screwdriver, and then you can remove and replace the micro switch.

Dismantle the screw and the seat of micro switch with 2 wrenches, one is **for holding**.



After separate the seat of micro switch, remove the retaining ring on the screw with spring pliers



Now you can see the spring inside and replace it.

SEPARATION OF THE MOTOR OF PUMP STATION



For the electric current of the **Relay** for the lifting motor is very big, and work continually hourly, the contact terminal of the relay is easy damaged. Please check it continually.



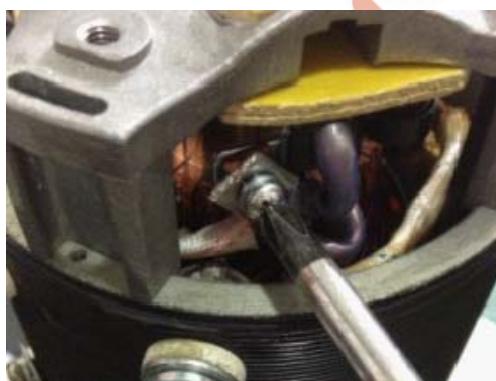
Remove 2 screws fixing 2 cables connecting the relay and motor



Remove 2 screws fixing the relay onto motor and remove the relay



Remove 2 screws on the top of motor, then press the tuber on the top cap and remove it, now you can see the internal parts of motor.



Remove the screw fixing the carbon brush, and then remove the clip fixing it, now you can remove the carbon brush.



Remove 4 screws on the top plate with wrench and screwdriver.



Now you can remove the stator of the motor, and then you can remove the rotor of the motor, and replace the part you want to.

SEPARATION OF THE VALVE PLATE

The oil will spill over when removing; keep clean for the stacker and yourself!



Remove one-way valve: Dismantle the screw of one-way valve with wrench and remove it.



Remove flow-control valve: Dismantle the screw of flow-control valve with wrench and remove it.



Remove the joint of hydraulic pipe: loosen it with wrench and remove it with hand.

7. MAINTENANCE CHECK LIST

7.1 HYDRAULIC OIL

Check oil mass once every six months. Suggest to use No.32 hydraulic oil (GB11118-89), its kinematic viscosity is 32cSt when it is on 400, the total amount is about 4.0 litre.

7.2 REGULAR MAINTENANCE

In order to keep an good using status, necessary check and maintenance everyday is suggested. Focusing mainly on: (1) wheels and mandrels, such as wires and rags binded on the wheels and mandrels; (2) whether the forks and the masts have deformation; (3) whether the voltage of the battery is normal and so on. After completing the work, unload the loads on the forks and lower the forks to the lowest position.

7.3 LUBRICATION

Add grease or oil onto all moving parts frequently in order to lubricate.

7.4 HOW TO CHARGE STORAGE BATTERY

- 2.1 Charge storage battery when its voltage is less than 10 Volt.
- 2.2 Please check the battery liquid before charging, if it is not enough, add some distilled water.
- 2.3 The charging environment should be ventilated and far away from the fire.
- 2.4 If the stacker not use for long time, charge it for not less than two hours every week.
- 2.5 The voltage on the indicator should not be over 15 Volt when charging.
- 2.6 Do not use the stacker when charging.

8. TROUBLE SHOOTING

No.	Trouble	Clause	Fixing Methods
1	The forks cannot be lifted to the maximum height	<ul style="list-style-type: none"> ● The hydraulic oil is not enough 	<ul style="list-style-type: none"> ● Pour in the oil
2	The forks cannot be lifted (Motor is rotary)	<ul style="list-style-type: none"> ● Without hydraulic oil ● The oil has impurities 	<ul style="list-style-type: none"> ● Fill in the oil ● Change the oil
3	The motor cannot run.	<ul style="list-style-type: none"> ● The urgent switch is pressed down, cut off the power ● The voltage is too low ● The connectors of electrical wire is loose ● The contactor of DC motor is broken 	<ul style="list-style-type: none"> ● Turn it clockwise, switch on the power ● Charge it ● Turn it firm ● Replace with a new one
4	The forks cannot be descended.	<ul style="list-style-type: none"> ● The piston rod or mast is deformed resulting from partial loading slanting to one side or over-loading ● The forks were kept in the high position for long time with piston rod bared to arise in rusting and jamming of the rod ● The release valve of pump is not opened 	<ul style="list-style-type: none"> ● Replace with a new one ● Keep the forks in the lowest position if not in use and pay more attention to lubricate the rod ● Check it, if damaged, replace with a new one
5	Leaks	<ul style="list-style-type: none"> ● Sealing parts worn or damaged ● Some part cracked or worn into small 	<ul style="list-style-type: none"> ● Replace with new ones ● Replace with new ones
6	The forks descend without the release valve worked.	<ul style="list-style-type: none"> ● The impurities in the oil causes the release valve to be unable to close tight ● Sealing parts worn or damaged ● The release valve is damaged 	<ul style="list-style-type: none"> ● Change the oil ● Replace with new ones ● Replace with a new one
7	The battery cannot be charged	<ul style="list-style-type: none"> ● Battery is broken ● The charging plug is loose 	<ul style="list-style-type: none"> ● Replace with a new one ● Turn it firm